Professional Training in AI

Graded Assignment (15 grade)

Case Study:

Ahmed is a young boy who cannot hear or speak. From the day he was born, he has lived in a world without sound. He communicates using **sign language**, but many people around him don't understand it.

At school, Ahmed feels left out. He tries to tell stories with his hands, but no one understands. His classmates want to help — and they get an idea from their teacher.

The Idea:

The class finds a dataset online **ASL Dataset**

It has thousands of pictures of hand signs — A to Z , del , nothing , space . The students decide to build a **machine learning model** that can recognize what Ahmed is signing using mediapipe gestures recognition and **write the words on the screen and record (with timestamp) in DB**.

Project Tasks and Evaluation Criteria:

1. Data Preparation (3 Marks)

- Download the **ASL Alphabet Dataset** from Kaggle: ASL Dataset Link
- Preprocess the image dataset by converting the ASL sign images into numerical format suitable for machine learning.

2. Model Development & Optimization (5 Marks)

- Build a machine learning classification model to identify ASL letters from images.
- Display a **confusion matrix** to evaluate classification performance.
- Apply hyperparameter tuning using **Grid Search** or **Random Search** to improve model accuracy and reduce classification error.

3. Sentence Testing & Demonstration (3 Marks)

- Test the trained model with **three short ASL sentences** (e.g., "HELLO", "I LOVE YOU", "HELP ME").
- Display the recognized sentence **on screen** in real time.
- Record a **short screen capture video** demonstrating each sentence being translated from signs to text.

4. Database Logging (2 Marks)

- Record recognized words along with their **timestamps** into a database.
- You may use either **MongoDB** (NoSQL) or **MySQL** (relational) for this task.

5. Submission & Repository (2 Marks)

- Upload the complete project, including:
    - Code
    - Model files
    - Processed data
    - Demo video
- Push all content to a **private GitHub repository**.
- Share access with the instructor for evaluation.